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EXAMINER	
WANG, EUGENIA	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/517,982	Applicant(s) TRIFONI ET AL.	
	Examiner EUGENIA WANG	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _08 April 2009_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-27_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-27_ is/are rejected.

7)☒ Claim(s) _2_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the amendment received April 8, 2009:

a. Claims 1-27 are pending.

b. The amendments to the Specification and Drawings are noted, wherein such changes serve to correct typographical errors.

c. The previous claim objections are withdrawn except for that applied to claims 12 and 13 with respect to the grammatical error between “channel” and “connect” is maintained.

d. The previous 112 rejections are withdrawn in light of the amendment.

e. The 103 rejection with respect to US 2002/0142201 (Nelson) in view of US 5482792 (Faita et al.) has been withdrawn in light of the amendment (as the new limitation to the claim with respect to the calibrated holes providing fluid fro one side to another side of a bipolar plate). The core of other rejections of record are maintained. A slightly different interpretation of the prior art of record is applied, wherein any changes made with respect to the rejection are necessitated by the amendment. Thus, the action is final.

Claim Objections

2. Claim 2 objected to because of the following informalities: having verb confusion with respect to the word "evaporated" in line 2. With the previous claim language the phrase “partially evaporated inside the reaction cell” was seen to be a verbal phrase modifying the prepositional phrase “of said cooling fluid,” also a modifier. However, with

the change in the subject to the cooling fluid, it is uncertain what purpose “evaporated” serves, a past tense action or a modifying phrase. Examiner submits that for better grammatical flow, the word “evaporated” should be ‘evaporates’. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. Claims 1-27 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 1 recites the limitation "the other side of said conductive bipolar plate" in lines 14-15. There is insufficient antecedent basis for this limitation in the claim. (It is noted that each bipolar plate has 6 faces, and thus stating "the other side" is indefinite as what constitutes "the other side" as the other side could constitute another face of the bipolar plate, or it could constitute another side of the same face (for example left and right side of a single face).) Since claims 2-27 are dependent on claim 1 and fail to rectify the issue, they are rejected for the same reason as well.

b. Claim 1 recites the limitation "the gaseous reactants" in line 22. There is insufficient antecedent basis for this limitation in the claim. It is noted that several of the claims dependent on claim 1 cite either “said gaseous reactants” or “the gaseous reactants” and are rejected as well (for non-limiting example claims 3, 9, 17, 19, 20, etc.) and are thus rejected independently from claim 1 for the

same reason. Since claims 2-27 are dependent on claim 1 and fail to rectify the issue, they are rejected for the same reason as well.

Claim Rejections - 35 USC § 102

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1-3, 5-12, 14-21, 24, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 00/63992 (Brambilla et al.).

As to claim 1, Brambilla et al. teach a membrane electrode generator (as depicted in fig. 1) with a multiplicity of reaction cells (the portion of elementary cell depicted by membrane [2], catalysts [4], and porous electrodes [3]) (fig. 1). Each reaction cell has an anodic chamber and cathodic chamber (note: the electrodes [3] and catalysts [4] appear in pairs, wherein one would inherently correspond to the anodic chamber and the other to the cathodic chamber, as such a pair of electrodes is necessary for fuel cell function), a proton exchange membrane [2], wherein gaseous reactants are fed to (to react) (see p 1, lines 10-17; p 8, lines 4-11 and 17-25; p 9, 1-4; fig. 1). Each reaction cell is delimited by a pair of conductive bipolar plates [7], wherein there is one adjacent to either electrode (corresponding to cathodic and anodic chambers) (fig. 1). Furthermore, there are apertures are on bipolar plates [7] and gaskets [6] (p 8, lines 17-19). (Note: Although only the gasket is shown, it is stated that the components are juxtaposed in order to form the according manifolds, and thus the bipolar plates would have the same openings shown as the corresponding gasket (fig. 1, the perforated feed/discharge areas; p 8, lines 17-19). Accordingly the gaskets

shown in figs. 5 and 6, with a plurality of fluid injection calibrated holes [15] would necessarily correspond to that of the bipolar plate as well. Water (cooling fluid) is injected into such calibrated holes in a calibrated manner (as the injection corresponds to a suitable flow of water, thus teaching of some sort of calibration) (p 6, lines 22-26; p 7, lines 1-4). Furthermore, it is stated that cooling/humidification water injected into the system are injected through channel [15] (on gasket [6]) but are passed to the reactants of the electrodes (and thus to the electrodes) through the reticulated element [5], wherein it is specifically noted that each bipolar plate is surrounded by the pair of a reticulated element [5] and gasket [6] (fig. 1; p 8, lines 11-17; p 10, lines 8-13). It is noted that with such a configuration, the bipolar plate must have holes (corresponding with that of the gasket), wherein water passes through one side (and thus is open to a water source on one side) of the bipolar plate to the opposing side (through the plate and hole) before being delivered to the reticulated element [5], and thus to each respective anodic and cathodic chamber. Example 1 supports such a position, as it is stated that the manifolds [8] are fed with water, wherein fig. 1 shows that the water manifolds run through bipolar plate [1] as well as gasket [6] (fig. 1; p11, lines 13-26). It is noted that there is a conductive reticulated element [5] on either side (cathode and anode) of the fuel cell (fig. 1). It is noted that the embodied reticulated element the same as that disclosed in US 5482792 (Faita et al., which is the same reticulated element used by the instant application). Specifically, a deformable metallic material, such as metal foam, is embodied (fig. 8). (Note: As seen in fig. 8, the metallic foam is shown to be a tridimensional network of wires.) Furthermore, it is noted that the

reticulated element [5] electrically connects the bipolar plates [7] to the electrodes [3] and distributes the gaseous reactants (p 8, lines 11-17).

As to claim 2, Brambilla et al. teach that the injected humidification water (cooling fluid) is evaporated inside of the cell in order to provide humidification as well as to remove heat (abs; p 6, lines 22-26; p 7, lines 1-4).

As to claim 3, it is noted that Brambilla et al.'s gasket is being relied upon to show the openings of the corresponding bipolar plates (as set forth in the rejection of claim 1). The gaskets in figs. 5 and 6 have fluid injection calibrated holes [15] corresponding to the reactant feeds (as they are placed in a specified location according to the feed) and to the side openings (also depicted by areas [15]) for feeding the cooling fluid itself (see example 6 (p 17, lines 19-24; p 18, lines 1-3, corresponding to fig. 5 and example 7 (p 18, lines 4-20) corresponding to fig. 6). As seen in figs. 5 and 6, side openings [15] are in a parametrical portion of the plate.

As to claim 5, as seen in Brambilla et al.'s fig. 1, bipolar plates [7] are interposed between two different sealing gaskets [6] (one from the anodic side of one reaction cell and one from the cathodic side of an adjacent cell). Each gasket has a hollow center portion where the conductive reticulated element resides ([14], housing for reticulated element). Feed openings for the reactants (for example embodied by [13] in fig. 5) exist, as do side openings (circular portions of the part labeled [15]) for passage of cooling fluid, and distribution channels (portion that both straight path portions of the part labeled [15] and opening [13] feed into) (fig. 5). As reticulated element [5] sits in

hollow portion [14], the openings as seen in fig. 5 would be it would be fluidly connected to the reticulated element..

As to claim 6, Brambilla et al.'s gasket of fig. 5 can be interpreted in the following manner: the wide base of triangular portion wherein parts [13] and [15] feed to constitute the distribution channels, the circular portion of [15] constitute the side opening, and the straight portion of [15] constitute a fluid collection channel connected to the side openings (circular portion of [15]), wherein the fluid collection channels (straight portion of [15]) are interposed between feed openings [13] and the distribution channel (triangular portion, as the wide base portion near the hollow portion for the reticulated element can be said to be the distribution channel, wherein at least a portion lies below the fluid collection channel (straight part of [15]).

As to claim 7, Brambilla et al.'s gasket of fig. 5 can be interpreted in the following manner: the triangular portion wherein parts [13] and [15] feed to constitute the distribution channels, the circular portion of [15] constitute the side opening, and the straight portion of [15] constitute a fluid collection channel connected to the side openings (circular portion of [15]), wherein the fluid collection channels (straight portion of [15]) is located between feed openings [13] and the distribution channel (triangular portion).

As to claim 8, Brambilla et al.'s fuel cell is one of a filter-press arrangement (p 8, lines 4-5). Furthermore, as previously noted, although only the gasket is shown, it is stated that the components are juxtaposed in order to form the according manifolds, and thus the bipolar plates would have the same openings shown as the corresponding

gasket (fig. 1, the perforated feed/discharge areas; p 8, lines 17-19). Accordingly, the fluid collection channels (straight portion of [15]) is present on a gasket and is superposed to the fluid injection calibrated holes (straight portion of [15], as would be on corresponding bipolar plate). There is some sort of correspondence of this to the distribution channel of the other sealing gasket, barring a specified correspondence).

As to claim 9, Brambilla et al. teach a fuel cell stack, wherein every other cell can be defined as a cooling cell (fig. 1). Each cooling cell has a perimetrical portion (gasket [6]) having a central hollow portion (housing for reticulated element [14]), side openings for the passage of cooling fluid (circular portion of [15]), fluid collection channel (straight portion of [15]), feed openings [13] for the passage of reactants, and discharge openings [12] for discharging reaction products and residual reactants, wherein reticulated element [5] sits in the central hollow portion [14]) (fig. 5).

As to claim 10, as seen in fig. 5, Brambilla et al.'s collection channel (straight portion of [15]) is located between the feed openings [13] and the hollow central portion [14].

As to claim 11, Brambilla et al.'s fuel cell is one of a filter-press arrangement (p 8, lines 4-5). It is noted that, although Brambilla et al. only show a gasket, it is stated that the components are juxtaposed in order to form the according manifolds, and thus the bipolar plates would have the same openings shown as the corresponding gasket (fig. 1, the perforated feed/discharge areas; p 8, lines 17-19). Accordingly, the fluid injection holes (portion on the bipolar plate corresponding to straight portion of [15] in the gasket) are superposed with the fluid collection channel (straight portion of [15]) (fig. 5).

As to claim 12, Brambilla et al.'s cell can be interpreted such that triangular portion wherein parts [13] and [15] feed to constitute a side channel connecting a side opening (circular part of [15]) to the hollow central portion [14].

As to claim 14, it is noted that, although Brambilla et al. only show a gasket, it is stated that the components are juxtaposed in order to form the according manifolds, and thus the bipolar plates would have the same openings shown as the corresponding gasket (fig. 1, the perforated feed/discharge areas; p 8, lines 17-19). Accordingly, it can be said that a multiplicity of first calibrated holes exist (as seen by lower hole [13], wherein at least one would exist for each reactant (fig. 5)). Likewise, the upper holes [12] (one for each reactant) constitute a multiplicity of second calibrated holes for discharging the reaction products and optionally of residual reactants. It can be shown that the fluid injection calibrated holes (corresponding to the straight portion of [15]) are placed in correspondence to that of the first calibrated holes (lower holes [13]), barring specification of the correspondence (fig. 5).

As to claim 15, Brambilla et al.'s first calibrated holes (lower holes [13]) are aligned and placed in correspondence with the feed openings (as they the same part). Likewise the second calibrated holes (upper holes [12]) are aligned and placed in correspondence to the discharge openings. As indicated on the gasket of fig. 5, such openings are on the perimetrical portion of the plates (as the gaskets openings correspond to likewise ones of the bipolar plates).

As to claim 16, Brambilla et al. teach of a sealing gasket [6] that covers only a perimetrical portion of the bipolar plate [7], as central portion [14] is hollow and forms a housing for the reticulated element to reside (fig. 5).

As to claim 17, using a broad interpretation, Brambilla et al.'s teaching can be applied. The gasket [6] on either side in every other cell can be considered to be a cooling cell (with the intermediate cells being the reaction cells). For example purposes, gasket [6] of fig. 5 is focused on. Using this interpretation, since gasket [6] is a "cooling cell" as the fuel cell it belongs to is not interpreted to be a reaction cell. However, the cells on either side of it are interpreted to be "reaction cells" (see fig. 1, wherein only every other cell is a reaction cell). Gasket [6] is considered to be a cooling cell sandwiched between two reaction cells. The frame of the gasket is the rigid perimetric portion (as it has some degree of rigidity, especially when compressed within fuel cell stack), with a hollow center [14] (fig. 5). As seen in fig. 5, the gasket area separates the gaseous reactants (inlets at the lower holes [12], outlets at the upper holes [13]) from the central portion (portion defined by [14]). Additionally, the hollow center [14] serves as a housing for the reticulated element, which is conductive (page 8, lines 4-11).

As to claim 18, Brambilla et al.'s gasket has reactant feed openings (shown by lower holes [13]), reactant discharge openings (shown by upper holes [12]), as well as side openings for the passage of cooling fluid (circular portion of [15]).

As to claim 19, Brambilla et al.'s additional cell is a gasket, and so each face is covered by a gasket that defines a rigid perimetrical portion (as the claim does not preclude the gasket and the additional cell being one in the same). The sections

depicted by [13] feed into can be considered zones for collecting the reactants, wherein the zones are connected to the respective feed openings through a feed channel (as reactant is introduced) in correspondence to the inlets, as some reactant would gather in the areas around the inlets, but blocked off by the seal area. Likewise, portions depicted by holes [12] can be considered a collection zone placed in correspondence to the outlets (and thus discharge/outlet channels), as some discharge would gather in the areas around the outlets, but blocked off by the seal area. Note, it can be interpreted that there is a channel that connects the collection zone to the outlet, with the channel being the height of the gasket itself.

As to claim 20, Brambilla et al.'s gasket [6] is the additional cell. And the portions of seal portions around the reaction inlets/outlets [13/12] serve to hinder the leakage of reactant and reactant products from entering the central hollow portion, and thus hinders the passage of gaseous reactants and reaction products within the cell (fig. 5).

As to claim 21, Brambilla et al.'s fuel cell is one of a filter-press arrangement (p 8, lines 4-5). It is noted that, although Brambilla et al. only show a gasket, it is stated that the components are juxtaposed in order to form the according manifolds, and thus the bipolar plates would have the same openings shown as the corresponding gasket (fig. 1, the perforated feed/discharge areas; p 8, lines 17-19). Accordingly, the gasket portions shown (see fig. 5) correspond to the bipolar portions (of feed and discharge), wherein the gasket is superimposed on the bipolar plates, and thus the calibrated holes would correspond to those of the gasket, wherein the height of the gasket can be said to be for collecting the reactants/products.

As to claim 24, it can be seen that Brambilla et al.'s fluid collection channel (created by the gasket) is superposed to the calibrated holes (straight part of [15]) (fig. 5).

As to claim 27, Brambilla et al. teach that the cooling liquid is humidification water (p 8, lines 11-17).

Response to Arguments

6. Applicant's arguments filed April 8, 2009 have been fully considered but they are not persuasive.

Applicant argues that it is not inherent that the channels [15] for injecting water (as in the gasket) have corresponding channels in the bipolar plate, as the bipolar plate may be smaller than the gasket, wherein the gasket surrounds a periphery of the bipolar plate such that the opening is outside the boundary of the bipolar plate.

Examiner respectfully disagrees. This is not the case with such a fuel cell system. Bipolar plate [7] extends as far as the gasket [6], and thus the teaching of the appropriate holes via juxtaposition of the fuel cell elements must result in holes of the gasket [6] corresponding to that of the bipolar cell (fig. 1; col. 8, lines 17-25). It is noted that example 1 supports such a position, as water is injected through manifolds [8], which cross both the gasket and bipolar plate [7] (p 11, lines 13-26). Accordingly, the arguments are not persuasive, and the rejection of record is maintained.

Applicant argues that Brambilla et al.'s system does not have a calibrated hole in the bipolar plate "wherein one end of the calibrated hole opens to a source of water on one side said conductive bipolar plate and the other end of the calibrated hole opens to

an adjacent chamber on the other side of the bipolar plate, so that water flows from one side of the bipolar plate through the calibrate hole to the adjacent chamber.

Examiner respectfully disagrees. Brambilla et al. teach such a structure, as manifolds [8], which run through bipolar plate [7] are fed with water, and thus one side of the bipolar plate is opened to a source of water, wherein the water passes through to the opposing side of the bipolar plate through the manifold [8] (fig. 1; p11, lines 13-26). Furthermore it is specifically stated that the electrodes are delivered humidification via the reticulated element [5] (p 8, lines 11-17). Thus the opposing side of the bipolar plate in some way provides water to the reactants and thus to the electrodes (anodic/cathodic chamber) themselves via the reticulated element (as the water passes through the bipolar plate), barring specification as to the structure in which water is passed to the anodic/cathodic chamber. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989). Such a structure is necessarily within the bipolar plate, or else water would not be able to flow through manifold [8] (as seen in fig. 1). Accordingly, the arguments are not persuasive, and the rejection of record is maintained.

Claim Rejections - 35 USC § 103

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

8. Claims 1, 3, 5-12, 14-20, 22, 24, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0142201 (Nelson) in view of US 5998054 (Jones et al.) and US 5482792 (Faita et al.).

As to claim 1, Nelson teaches a membrane electrochemical generator with a multiplicity of cells (fuel cell stack [10]), where gaseous reactants are fed into a fuel cell stack (para 0026, lines 1-7; fig. 1). Each fuel cell has an anode with a corresponding anode side (anodic chamber) and a cathode with a corresponding cathode side (cathodic chamber), wherein a proton exchange membrane is placed in between (para 0005; para 0031; fig. 1). Additionally, fig. 1 depicts one fuel cell [12] (reactive cell) that is broken out. It is noted that each fuel cell includes a membrane electrode assembly (MEA) [18], gaskets [42, 44], anode cooler plate [16], and cathode cooler plate [20]. The cooler plates [16, 20] serve as the conductive bipolar plates as adjacent to and corresponding to each specified electrode, and are inherently conductive through the MEA portion [18], as is required for fuel cell function within a stack. Furthermore, it cooler plate shows a multiplicity of fluid injection calibrated holes (water inlet ports [58a-d]) for water to be injected in some sort of manner (and thus imparting some sort of calibrated flow) (fig. 3). Accordingly, one side of the cooler plate is open to a water source.

(a) Nelson does not teach specifically teach that water (cooling fluid) is injected through the conductive bipolar plate such another side of the bipolar plate provides the fluid to the corresponding adjacent chamber (cathodic or anodic).

Jones et al. teach of fuel cells having a conductive fluid flow plate [120], wherein a bipolar plate is embodied (col. 5, lines 32-40; fig. 2). Specifically, liquid water is metered into each fluid flowplate inlet [126] through injection ports [131] such that water is directly supplied to the reactants of the fuel cell (col. 6, lines 28-37; fig. 3). The motivation for metering water into the reactants is to advantageously and properly humidify the reactants (col. 7, lines 15-27). Therefore one of ordinary skill in the art at the time the invention was made would have found it obvious to use the structure of Nelson in such a way to promote proper humidification of the cell (i.e. inject cooling fluid (water) into the reaction cell). (It is noted that combination would yield the structure of Nelson, wherein water from injection ports would be open to the reactant side as well (facing the electrode and thus the corresponding anodic or cathodic chamber), thus providing the water to the electrode through the hole in bipolar plate on the side opposite of that of the injection side (side facing the source).)

(b) Nelson does not teach of a reticulated element that is a tridimensional network of wires that electrically connects the conductive bipolar plates to the electrodes while simultaneous distributing the gaseous reactants.

Faita et al. teach of a similar system with a MEA [6, 7] with a gaskets [8] and bipolar plates [1] on each side (fig. 1). Faita et al.'s system, however, further includes conductive reticulated element (collector [14]) disposed within the gasket, wherein the reticulated element the reticulated element is a tridimensional network of wires that electrically connect the bipolar plates to the electrode while simultaneously distributing gaseous reactants (note the reactants must pass through the collector [14] in order to

contact the electrode) (col. 7, lines 20-27; figs. 1-4). The motivation for including a reticulated element disposed in a gasket area on both sides of the MEA, as taught by Faita et al. to provide (a) a multiplicity of contact points with the electrodes to minimize the energy dispersion related to excessively long transversal paths of electric current inside the electrodes, (b) low values of contact resistance with the surface of the bipolar plates, (c) heat transmission from the MEA to the bipolar plate, (d) a longitudinal flow of reactants with small pressure drop and uniform distribution on the whole surface of the electrodes due to large possibility of transversal mixing, (e) easy drain of liquid water formed by condensation inside the collector during operation, and (f) deformability with sufficient residual resiliency under compression to compensate unavoidable planarity defects of various components of the cells (col. 6, lines 57-67 to col. 7, lines 1-15). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to have incorporated the reticulated elements (current collector [14]) into the system of Nelson in order to provide the advantageous characteristics (a)-(f), as set forth above.

As to claim 3, Nelson shows that the fluid injection calibrated holes [58a-d] are mutually aligned to cathode intake (feed) opening [24] and anode intake (feed) opening [30] as well as coolant intake (feed) opening [34], wherein coolant opening [34] can interpreted to be a side opening in a perimetrical portion of cathode cooler plate [20] or anode cooler plate [16] (figs. 3 and 4).

As to claim 5, the combination of Nelson and Faita et al. obviates such a claim. Nelson's fuel cell stack has bipolar plate interposed between a pair of sealing gaskets,

as demonstrated by coolant seal gasket [42] (anodic sealing gasket) and membrane gasket [44] (cathodic sealing gasket) (fig. 1). (Note: The membrane gasket [44] of fuel cell [12] and the coolant seal gasket [42] of fuel cell [14] (adjacent cells [12] and [14]) would surround the combined cathode cooler plate [20] of fuel cell [12].) The gaskets [42] and [44] form a hollow center portion, wherein the reticulated portion (the current collectors [14] of Faita et al.) would sit, as obviated above. Using gasket [42] (wherein the reticulated element of Faita et al. resides in) and comparing it to that of anode cooler plate [16] of fuel cell [12] as a visual example, it is seen that the feed openings of the reactants [30, 24, 26, 32], the coolant side openings [34, 36], and the distribution channels that are fluidly connected to the feed openings [38], and thus serve to fluidly connect to the reticulated element (obviated by Faita et al.) (fig. 1 of Nelson).

As to claims 6 and 7, Nelson teaches that cathode reactant surface [27] has a gasket group [76] that receives the membrane gasket [44] (para 0042). Therefore groove [76] is indicative of how gasket [44] fits onto the plate. As seen in fig. 4, there is a fluid collection channel (water channel [72]) connected to side opening [34] interposed between cathode and anode opening [24, 30] and the cathode channels [28a-d]. As water channel [72] delivers water from water intake [70] to the water inlet ports [58a-d], it collects cooling fluid (fig. 4; para 0041) (as applied to claims 6 and 7). Furthermore, it can be noted that the fluid connection channel [72] is connected to the distribution channels [28a-d], as it is placed next to the area where the distribution channels are (fig. 4) (as applied to claim 7).

As to claim 8, Nelson teaches that channel [72] is superposed on the fluid injection calibrated holes [58a-d] (compare to membrane gasket [44]) (figs. 1 and 4). There is some sort of correspondence of this to the distribution channels of the other sealing gasket, barring a specified correspondence (compare the superimposition of membrane gasket [44] to coolant seal gasket [42]). (Note: Absent clear definition, the assembly obviated by Nelson in combination with Faita et al. is considered to be filter-press, as a stack would be pressed together.)

As to claim 9, Nelson in combination with Faita et al. would obviate such a limitation. Nelson teaches a fuel cell stack, wherein every other cell can be defined as a "cooling cell." Therefore, in fig. 1, fuel cell [12] can be defined as a reaction cell, fuel cell [14] can be defined as an additional cell, and fuel cell [15] can be defined as a reaction cell, etc. (although only 3 cells are shown in the stack, a typical stack includes many more) (para 0026). The cooling cell comprises a gasket [42, 44] (perimetrical portion having a central hollow portion). For example, taking the gasket groove [76] of fig. 4, it is indicated that there is an opening for the passage for the cooling fluid [34]. There is a fluid collection channel (groove corresponding to water channel [72]) connected to side opening [34] (fig. 4). Furthermore, that the gasket allows for feed openings for passage of gaseous reactants (cathode and anode inlet openings [24], [30]) and discharge openings for discharging reaction products and residual reactants (anode and cathode outlet openings [32], [26]) (fig. 4). (This is applying the features of exemplified fuel cell [12] to that of fuel cell [14].) It is noted that since every other fuel cell is being relied upon to be a cooling cell, Faita et al.'s conductive reticulated element (sitting in the

hollowed portion of the gasket, as obviated in the rejection to claim 1) would be within these cells as well.

As to claim 10, Nelson's has fluid collection channel [72] placed between the feed openings [30, 4] and the central hollow portion (the part where the channels [28a-d] of the cooler plate [20] are).

As to claim 11, Nelson teaches the fluid collection channel (portion of gasket represented by the groove portion corresponding to channel [72]) is superposed on the fluid injection calibrated holes [58a-d] of the bipolar plate (cathode cooler plate [20]) (fig. 4). (Note: Absent clear definition, the assembly of Nelson combined with Faita et al. is considered to be filter-press, as a stack would be pressed together.)

As to claim 12, Nelson's gasket portion with the hollow center is fluidly connected with a side opening (coolant inlet [34]) via a side channel (water collection portion [72]) via the channels of the coolant plate [20].

As to claim 14, Nelson teaches a bipolar plate (as exemplified by cathode cooler plate [20]) with a multiplicity of first calibrated holes for the passage of reactants [68a-68d] and a multiplicity of second calibrated holes for the discharge of optional residual reactants [70a-d]. It can be shown that the fluid injection calibrated holes [58a-d] are placed in correspondence to that of the first calibrated holes [68a-d].

As to claim 15, Nelson's invention has first calibrated holes [68a-d] mutually aligned and placed in some sort of correspondence to feed openings [24, 30] of the bipolar plate (cathode cooler plate [20]) (fig. 4). Accordingly, second calibrated holes [70a-d] are placed in some correspondence to discharge openings [26, 32], which are

placed on a perimetrical portion of conductive plate [20] (fig. 4). (Note: In another interpretation, the bipolar plate can comprise of the combination of the cathode cooler plate [20] and anode cooler plate [16], which is not shown. However it is mentioned that it is the mirror image to that of the cathode plate (para 0043).)

As to claim 16, Nelson's stack has a sealing gasket (membrane gasket [44]) that is seen to cover only one face of the bipolar plate (cathode cooler plate [20]), wherein the gasket [44] has a central hollow portion for conductive reticulated element (the inclusion of Faita et al.'s collector [14], as obviated within the rejection to claim 1).

As to claim 17, using a broad interpretation, Nelson's teaching can be applied. Either gasket [42, 44] of the cooler plates in every other cell can be considered to be a cooling cell (with the intermediate cells being the reaction cells). For example purposes, membrane gasket [44] is focused on. Using this interpretation, since membrane gasket [44] is a "cooling cell" as the fuel cell it belongs to is not interpreted to be a reaction cell. However, the cells on either side of it are interpreted to be "reaction cells." Using fig. 1, the cell to the right of fuel cell [12] (not shown) is a reaction cell, as is fuel cell [14]. Fuel cell [12] is not interpreted to be a reaction cell, however membrane gasket [44] is considered to be a cooling cell sandwiched between two reaction cells. The frame of the gasket is the rigid perimetric portion (as it has some degree of rigidity, especially when compressed within fuel cell stack), with a hollow center (fig. 1). (For a better view of the shape of the gasket, please refer to fig. 4, item [76]. Item [76] is a groove for the gasket, and so the gasket's shape is as shown.) As seen in fig. 4, the gasket area separates the gaseous reactants (fuel inlet [30], fuel outlet [32], oxidant inlet [24] and

oxidant outlet [26]) from the central portion (portion defined by the channels [28]). Recall that the combination of Faita et al. with Nelson yields the structure, wherein the hollow center (of the gasket of Nelson) has a conductive reticulated element residing on it (the current collector [14] of Faita et al.) (as obviated in the rejection to claim 1).

As to claim 18, Nelson's gasket (as embodied by the shape of the gasket groove [76] for clarity's sake) has reactant feed openings [30, 24], reactant discharge openings [26, 32], as well as side openings for the passage of cooling fluid [34, 36].

As to claim 19, Nelson et al.'s additional cell is a gasket, and so each face is covered by a gasket that defines a rigid perimetrical portion (as the claim does not preclude the gasket and the additional cell being one in the same). The sections that separate the reactant inlets [30, 24] can be considered a zone for collecting the reactants, wherein the zones are connected to the respective feed openings through a feed channel (as reactant is introduced) in correspondence to the inlets, as some reactant would gather in the areas around the inlets, but blocked off by the seal area. Likewise, the sections that separate the reactant outlets [26, 32] can be considered a collection zone placed in correspondence to the outlets (and thus discharge/outlet channels), as some discharge would gather in the areas around the outlets, but blocked off by the seal area. Note, it can be interpreted that there is a channel that connects the collection zone to the outlet, with the channel being the height of the gasket itself.

As to claim 20, Nelson's gasket [44] is the additional cell. And the portions of seal portions around the reaction inlets/outlets [30/24, 26/32] serve to hinder the

leakage of reactant and reactant products from entering the central hollow portion, and thus hinders the passage of gaseous reactants and reaction products within the cell.

As to claim 22, Nelson teaches that fluid injection calibrated holes [58a-d] are placed between first calibrated holes [68a-d] (fig. 4). The gasket (defined by gasket groove [76] in fig. 4) defines a fluid collection channel, wherein some portion is below the feed openings [30, 24]. The channel is defined by the height of the height of the gasket.

As to claim 24, it can be seen that the fluid collection channel (created by the gasket, its represented structure filling that of gasket groove [76]) is superposed to the calibrated holes [58a-d].

As to claim 27, Nelson teaches that the coolant is a mixture of gas and liquid water (abs).

9. Claims 1, 2, 4, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones in view of Faita et al.

As to claim 1, Jones et al. teaches an electrochemical generator (fuel cell assembly [100]), wherein the working section [114] made up of many layers [118] that form fluid manifolds for supplying fluids to and removing fluids from the working section, where each layer forms a working cell (the exemplified multiplicity of cells provided being 108) (col. 4, lines 65-67; col. 5, lines 1-10; fig. 1). It is noted that fuel cell is a PEM-type fuel cell with a cathode (cathodic chamber) and an anode (anodic chamber) around a PEM (membrane) (col. 5, lines 10-20). (The cells must react with the reactants in order to provide the function of a fuel cell.) The cells have a fluid flow plate

[120] made of conductive material, such as graphite and can be a **bipolar**, monopolar, anode cooler, or cathode cooler plate (col. 5, lines 32-40; fig. 2). It is noted that each fluid flow plate [120] corresponds to either side of the fuel cell, and thus corresponds to either an anodic or cathodic chamber side (fig. 3).Furthermore, liquid water is metered into each fluid flowplate inlet [126] through injection ports [131] (wherein it is interpreted that the injection ports [131] on the face [122] is part of the fluid flow plate [120] (col. 6, lines 28-37; fig. 3). As liquid water is injected, it is considered that it is a cooling fluid that is injected inside the reaction cells [118]. (It is said that the injection ports [131] can be made circular with a diameter of 0.005 to 0.010 inches, thus imparting some calibration to the holes and some calibration to the flow with respect to the hole size.) Furthermore, it is noted that it can be interpreted that the injection holes opening towards porous block [142] faces the water source (as that is where the injection of water takes place). Furthermore, it can be said that the other end of the holes (facing channels [124]) opens indirectly to another side of the conductive bipolar plate, wherein the sides are split up along a single face, with the portion of the flow plate [120] and face [122] facing porous block [142] constituting one side, and everything leftwards of the porous block [142] (as seen in fig. 3) constituting the other side, as water is transported to all active portions PEM [138] via the fluid manifolds [150] (col. 6, lines 28-42; fig. 1). In such a manner, since the water is delivered to the active portions of the PEM [138] (and thus the corresponding adjacent chamber), the water is delivered through the hole, wherein the bottom of the hole (facing the channels [124]) opens indirectly to the other side of the conductive plate (portion facing the PEM) in such a

manner that water is delivered to the PEM [138], barring specification of how the holes and chambers are related to different sides of the bipolar plate. Office personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Also, limitations appearing in the specification but not recited in the claim are not read into the claim. See *In re Zletz*, 893F.2d 319, 321-22,13 USPQ2d, 1320, 1322 (Fed. Cir. 1989).

Jones et al. does not teach of a reticulated element that is a tridimensional network of wires that electrically connects the conductive bipolar plates to the electrodes while simultaneous distributing the gaseous reactants.

Faita et al. teach of a similar system with a MEA [6, 7] with bipolar plates [1] on each side (fig. 1). Faita et al.'s system, however, further includes conductive reticulated element (collector [14]) disposed within a gasket on either side of the membrane electrode assembly of the fuel cell, wherein the reticulated element is a tridimensional network of wires that electrically connect the bipolar plates to the electrode while simultaneously distributing gaseous reactants (note the reactants must pass through the collector [14] in order to contact the electrode) (col. 7, lines 20-27; figs. 1-4). The motivation for including a reticulated element disposed in a gasket area on both sides of the MEA, as taught by Faita et al. to provide (a) a multiplicity of contact points with the electrodes to minimize the energy dispersion related to excessively long transversal paths of electric current inside the electrodes, (b) low values of contact resistance with the surface of the bipolar plates, (c) heat transmission from the MEA to the bipolar plate,

(d) a longitudinal flow of reactants with small pressure drop and uniform distribution on the whole surface of the electrodes due to large possibility of transversal mixing, (e) easy drain of liquid water formed by condensation inside the collector during operation, and (f) deformability with sufficient residual resiliency under compression to compensate unavoidable planarity defects of various components of the cells (col. 6, lines 57-67 to col. 7, lines 1-15). Therefore it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to have incorporated the reticulated elements (current collector [14]) into the system of Jones et al. in order to provide the advantageous characteristics (a)-(f), as set forth above.

As to claim 2, Jones et al.'s invention would inherently have some degree of evaporation, as the liquid water (cooling liquid) is injected and provides humidification and thermal management as it passes through the cell. (The reason for inherency is that the fuel cell runs at a certain temperature and thus by passing liquid water through it, some of it would evaporate to some degree, thus absorbing heat and removing heat generated in the reaction of the electrochemical generator.)

As to claim 4, Jones et al. teaches that the diameter of the injection ports [131] is circular with a diameter of 0.005 to 0.010 in., depending on such factors as desired water injection rates (col. 5, lines 64-66). Using the conversion that 1 in. = 25.4 mm, the range 0.005 to 0.010 in. is equivalent 0.127 mm to 0.254. Therefore for the range of 0.200 mm to 0.254 mm overlaps the range claimed by the instant application and thus obviates the claimed range.

As to claim 27, Jones et al. teaches that liquid water is injected into ports 131 (col. 6, lines 28-38), and thus it can be considered a cooling fluid.

Response to Arguments

10. Applicant's arguments filed April 8, 2009 have been fully considered but they are not persuasive.

It is noted that the rejection with respect to Nelson in view of Faita et al. has been withdrawn in light of the amendment, as it was directed towards an intended use language previous claim set. Now, the claims more clearly specify the fact that water is injected in such a manner that it is introduced to the anodic and cathodic chambers. Accordingly arguments with respect to such a newly claimed feature are moot. However it is noted that an alternate rejection had been previously applied giving weight to the previous intended use language using Nelson, Faita et al., and Jones et al. The core of such a rejection has been maintained herein with changes made in light of the amendment.

Examiner, however, would like to take the opportunity to address the pertinent issues in the remarks that still apply to rejection as maintained above (specifically with respect to the combination of Faita et al. with Nelson).

Applicant argues that one of ordinary skill in the art would not have added a reticulate material to the fuel cell of Nelson, because (1) the channels in Nelson distribute the gaseous reactants and there would be no need for a second distribution layer, (2) that since the channels in Nelson contact the membrane electrode assembly that electrical contact is established, wherein no additional means is required.

Examiner respectfully disagrees.

With respect to (1), just because Nelson has a distribution means does not render the inclusion of a secondary distribution means non-obvious. It does not negate the teaching of Faita et al. or the motivation provided therein (to provide (a) a multiplicity of contact points with the electrodes to minimize the energy dispersion related to excessively long transversal paths of electric current inside the electrodes, (b) low values of contact resistance with the surface of the bipolar plates, (c) heat transmission from the MEA to the bipolar plate, (d) a longitudinal flow of reactants with small pressure drop and uniform distribution on the whole surface of the electrodes due to large possibility of transversal mixing, (e) easy drain of liquid water formed by condensation inside the collector during operation, and (f) deformability with sufficient residual resiliency under compression to compensate unavoidable planarity defects of various components of the cells (col. 6, lines 57-67 to col. 7, lines 1-15)). Applicant has not provided any proof or showing that the inclusion of such a feature would not provide the advantages as listed above. Accordingly, it is still seen that one of ordinary skill in the art would find it obvious to include such an element to provide the advantageous characteristics as set forth in (a)-(f) above. Thus the arguments are not found to be persuasive, and the rejection of record is maintained.

With respect to (2), just because Nelson's channels have electrical contact with the membrane electrode assembly does not render the inclusion of a secondary distribution means non-obvious. It does not negate the teaching of Faita et al. or the motivation provided therein (to provide (a) a multiplicity of contact points with the

electrodes to minimize the energy dispersion related to excessively long transversal paths of electric current inside the electrodes, (b) low values of contact resistance with the surface of the bipolar plates, (c) heat transmission from the MEA to the bipolar plate, (d) a longitudinal flow of reactants with small pressure drop and uniform distribution on the whole surface of the electrodes due to large possibility of transversal mixing, (e) easy drain of liquid water formed by condensation inside the collector during operation, and (f) deformability with sufficient residual resiliency under compression to compensate unavoidable planarity defects of various components of the cells (col. 6, lines 57-67 to col. 7, lines 1-15)). Applicant has not provided any proof or showing that the inclusion of such a feature would not provide the advantages as listed above. Accordingly, it is still seen that one of ordinary skill in the art would find it obvious to include such an element to provide the advantageous characteristics as set forth in (a)-(f) above. Thus the arguments are not found to be persuasive, and the rejection of record is maintained.

It is noted that Applicant has addressed the rejections with respect to the combination of Nelson, Faita, and Jones or Jones and Faita (as applied in the previous rejection, wherein the core of those rejections have been maintained above, with any changes made as necessitated by the amendment). Accordingly, those rejections are presumed to be valid and are applied within the rejection.

Allowable Subject Matter

11. Claims 13, 23, 25, and 26 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

It is noted that claims 23, 25, and 26, previously indicated as allowable, are no longer allowable in light of the 112(2) issues introduced into the independent claim that they are dependent upon.

The reasons for as to why claims 13, 23, 25, and 26 have been set froth in the actions dated October 17, 2007, March 27, 2008 and December 8, 2008 and are herein incorporated.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EUGENIA WANG whose telephone number is (571)272-4942. The examiner can normally be reached on 7 - 4:30 Mon. - Thurs., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/E. W./
Examiner, Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795